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GENERAL LAND OFFICE

PUBLIC LAND SYSTEM
OF THE
UNITED STATES

HISTORICAL OUTLINE

BY

S. V. PROUDFIT
OF THE GENERAL LAND OFFICE

THE
RECTANGULAR SYSTEM OF SURVEYING

BY

FRANK M. JOHNSON
U. S. SUPERVISOR OF SURVEYS

WASHINGTON
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entire Nation, which has been observed down to the present day, not only with respect to the lands thus donated but also as to those which later came into the possession of the United States.

Accessions to the public domain

1. The Louisiana Purchase; from France, April 30, 1803: This practically includes the western drainage basin of the Mississippi River; price paid, $27,267,621.98.

2. Florida, by treaty of February 22, 1819: Purchase price paid to Spain, $6,489,768; area, the present State of Florida.

3. Oregon: Title established in 1846, on basis of exploration and occupation, theretofore in dispute with Great Britain; territory embraces the present States of Oregon, Washington, and Idaho.

4. From Mexico, by treaty of Guadaloupe Hidalgo, February 2, 1848, at the close of the war with Mexico: This cession gave the United States the States of California, Nevada, and part of Colorado, also Utah and part of Arizona and New Mexico; price paid Mexico, $15,000,000.

5. From Texas: By act of Congress of September 9, 1850, the United States purchased from Texas her claim to certain lands now included in Kansas, Colorado, New Mexico, and also the "public-land strip," for which $16,000,000 was paid.

6. From Mexico, by purchase, December 30, 1853, through James Gadsden, United States minister, on behalf of the United States, now known as the "Gadsden purchase," to rectify the southern boundary of the United States: Purchase price, $10,000,000. This territory now lies in New Mexico and Arizona.

7. From Russia, Alaska, by purchase made March 3, 1867, from the Empire of Russia: Purchase price, $7,200,000.

The General Land Office

The Colonial Congress, September 16, 1776, passed a resolution making grants of lands to certain officers and soldiers, such lands to be provided by the United States and the expense of procuring them to be borne by the States as other expenses of war.

May 20, 1785, and thereafter, the Board of Treasury under the Confederation made sales of public lands and gave certificates of purchase. The first patents for lands by the Government were issued by this board; the first was dated March 4, 1788, and the last March 3, 1789.

The act of August 7, 1789 (1 Stat. 49), gave the Secretary of War supervision over the granting of lands to persons entitled thereto for military services rendered the United States, and by the act of September 2, 1789 (1 Stat. 65), the Secretary of the Treasury was charged with the execution of such duties relative to the sale of the lands belonging to the United States as might by law be required.

The act of May 18, 1796 (1 Stat. 464), for the sale of lands in the Northwest Territory, now in the State of Ohio, provided for a surveyor general, defined his duties, and directed that plats of survey be sent to the Secretary of the Treasury, who thereafter gave notice of sales and performed other executive duties. He became the executive power or agent in the sale or disposition of the public domain, issuing patents for grants of land, etc., with the aid of registers and receivers of the district land offices after 1810, and remained so until the organization of the General Land Office in his department.

April 25, 1812 (2 Stat. 716), Congress created the office of the Commissioner of the General Land Office, and made his bureau subordinate to the Treasury Department, giving him authority to issue patents and perform duties formerly executed by the several departments. The Secretary of the Treasury, by acts of Congress, thereafter was given general supervision of the Commissioner of the General Land Office, and appeals from the action of the commissioner were made to him.

By act of July 4, 1836 (5 Stat. 107), the General Land Office was reorganized, and the executive duties appertaining to the survey and sale of the public lands and the issuance of patents were devolved on the commissioner; and a principal clerk of the public lands, a principal clerk of private land claims, a principal clerk of the surveys, a recorder of the General Land Office, and a solicitor of the General Land Office, and a secretary to sign the President's name to all land patents were authorized.

By act of March 3, 1849 (9 Stat. 395), Congress created the Home (now Interior) Department, and by section 3 of the law provided that the Secretary of the Interior " shall perform all the duties in relation to the General Land Office of supervision and appeal now discharged by the Secretary of the Treasury."

The General Land Office has since remained a bureau under the supervision of the Secretary of the Interior.

The statutory definition of the duties of the Commissioner of the General Land Office contains an excellent outline as to the scope of the work intrusted to the General Land Office:

> The Commissioner of the General Land Office shall perform, under the direction of the Secretary of the Interior, all executive duties appertaining to the surveys and sale of public lands of the United States, or otherwise respecting such lands, and also such as relates to private claims of lands and the issuing of patents for all grants of lands under the authority of the Government. (Sec. 453, U. S. Rev. Stat.)

To enable the commissioner to properly discharge the duties thus imposed upon him, Congress has provided an assistant commissioner, who, in addition to other duties, may act as commissioner in the absence of that officer; also a legal, scientific, administrative, and

clerical force which operates under the direction of the commissioner, through five principal branches—the Washington office, the district land offices, the offices of the surveyors general, the field surveying service, and the field service. The Washington office is the controlling and directing branch of the work, and the district land offices are the medium through which the public generally throughout the country transacts its public-land business, especially in presenting applications for lands under the laws applicable thereto. The offices of the surveyors general receive the returns of surveys performed in the field and prepare the necessary records, field notes, and plats of surveys. The field surveying organization is the branch of service which does the actual work of surveying; while the field service is charged primarily with the duty of protecting the public lands from fraudulent acquisition of title thereto, and for that purpose conducts investigations in the field and reports results to the General Land Office.

For the orderly dispatch of the immense volume of business transacted under our public-land system, a well-defined procedure is fixed by which claims to the public lands may be initiated and finally adjudicated, or conflicting rights determined. If parties applicant before the district land officers are aggrieved at the action taken therein, the right of appeal lies to the commissioner, and from his decision an appeal may be taken to the Secretary of the Interior.

Surveys

An essential prerequisite to the sale and conveyance of the public lands was an accurate survey by which descriptive data could be secured for the identification on the record, and on the ground, of the tracts sold and conveyed. Congress, by the ordinance of May 20, 1785, adopted what is known as the rectangular system of surveys, providing for the division of the public lands into townships of 6 miles square, by lines running due north and south and others crossing these at right angles, and the subdivision of the township into 36 "lots" of 640 acres each, numbered from 1 to 36. This, in substance, substituting *sections* for "lots," and with minor modifications, is the law under which our surveys from that time forward were executed. For many years the surveys of public lands were made under contracts secured by the surveyors general, but, due to the want of direct supervision on the part of the General Land Office, this system proved very unsatisfactory, and in 1910 Congress authorized what is now styled the "direct system" of surveys, in which the work of surveys and resurveys in the field is carried on by cadastral engineers, under the immediate direction of the commissioner.

Disposition of public domain

The primary conception of Congress in dealing with the public lands was the realization of the largest possible cash return for their

sale to meet the immediate necessities of national enterprise. The General Land Office was organized in accordance with this conception; practically a real estate agency acting for the United States in the sale of its public domain. Under the statutory provisions enacted in 1785 and 1796 and by the act of May 10, 1800, the conversion of public lands into cash funds was, in brief, the congressional definition of the powers and duties of the General Land Office.

Since that time policies widely different, involving a broader conception of the proper foundation of our national institutions and a better development of the entire country, gradually came to be recognized, and took form in the later statutes that substantially abandoned the cash-sale proposition and adopted a theory based on the enhancement of agricultural values, in which the entire nation would ultimately profit. The preemption law of September 4, 1841 (5 Stat. 452), was the first substantial recognition of the later theory, in which a preference right to the purchase of 160 acres was acquired through settlement upon the land. The law as then enacted was the outgrowth of the necessity for making some provision for the acquisition of a right by settlement; the earlier preemption laws, in permitting the settler to purchase, in effect condoned the prior trespass on the part of the settler in going upon the public land without authority. In fact, the act of March 3, 1807 (2 Stat. 445), forbade settlement prior to sale.

The homestead act of May 20, 1862 (12 Stat. 392), was the logical successor of the preemption law, in which the home was made the unit of development and citizenship a prerequisite to the right of final entry, thus uniting ownership with settlement, and use of the land with taxation under the laws of the State. When entries under the original homestead act authorizing the appropriation of 160 acres had practically exhausted the fertile prairie lands west of the Missouri River, Congress, recognizing that a larger acreage of the remaining lands was necessary for the maintenance of a home, that the area of the entry should be measured by the earning capacity of the land, enlarged the homestead entry to include 320 acres, by the act of February 19, 1909 (35 Stat. 639), and later, by the act of December 29, 1916 (39 Stat. 862), authorized a homestead for 640 acres where the land was more fit for stock raising than for ordinary agricultural purposes, having in the meantime, by the act of June 17, 1902 (32 Stat. 388), opened a new field of operation through the reclamation of arid lands not theretofore cultivable but by irrigation made susceptible of intensive cultivation. In all these various modifications of the original homestead act the primary conception of the home as the only basis of State and national permanence has been kept intact.

The reclamation of arid and semiarid lands through irrigation projects operated by private enterprise, as distinguished from Federal reclamation projects, has been made a profitable field of enterprise under the desert-land act of March 1, 1877, and the amendatory act of March 3, 1891, while to the same end the Carey Act of 1894, dealing with the same class of lands, has made provision for their reclamation through irrigation projects initiated and operated under State control.

As a natural outgrowth of the theory of development of our national resources, Congress early began to make liberal donations of the public lands to the several new States as they were admitted to the Union for the support of common schools and internal improvements; also granted to a number of the States the swamp lands therein to aid in affecting their drainage and reclamation; and later made grants, sometimes to the States and sometimes directly to chartered companies, in aid of railroad construction, a policy which has operated to broaden and at the same time unify the rapid expansion of our national growth.

Mineral lands of the United States are subject to disposition only under laws especially providing for their exploration and sale; hence laws providing for entries under the homestead and kindred acts, for grants to the States or in aid of railroads, exclude from their operation lands mineral in character. This has been the policy of Congress in dealing with its mineral lands practically from the inception of our public-land system, though it was not until the several acts of July 26, 1866, July 9, 1870, and May 10, 1872, that this policy found expression in statutes authorizing the exploitation of our mineral deposits, the local customs and rules of miners in the several mining districts prior thereto governing mining operations on our public lands. But by these acts provision was made for the acquisition of title to mineral lands based on discovery followed by application for patent. Later theories of conservation led to the Executive withdrawal from all forms of entry of certain nonmetalliferous minerals, the enactment of the statutes of March 3, 1909, and June 22, 1910, providing for the issuance of patents with a reservation to the United States of the coal contained in the land, and the act of July 17, 1914, for patents with a similar reservation of certain other nonme talliferous minerals, all looking to future legislation which ultimately took form in a leasing system for the disposition of minerals of that character, as in the act of October 20, 1914, for leasing coal lands in Alaska; the act of October 2, 1917, for leasing lands containing deposits of potash; and the act of February 25, 1920, for leasing lands containing deposits of coal, phosphate, oil, oil shale, gas, and sodium.

National forests

The importance of Federal conservation of our natural resources, recognized by Congress in its legislative policy with respect to mineral lands, led to the adoption of a provision in the act of March 3, 1891, authorizing the President to set apart and reserve public lands containing timber as public reservations. Under this authority, the later act of June 4, 1897, and the act of March 1, 1911, authorizing the acquisition of lands in private ownership, national forests have been established embracing an area of 181,799,997 acres, as shown by the last annual report of the General Land Office, of which area 1,740,565 acres were acquired under the act of 1911.

It should be noted that mineral lands within the national forests that were formerly a part of the public domain remain subject to exploration and purchase under the mining laws applicable thereto.

Under the provisions of the act of February 1, 1905, the Department of Agriculture is charged with the administration of national forests, while jurisdiction over matters affecting the title to lands within the national forests is vested in the Department of the Interior.

Alaska

The total area of the Territory is 378,165,760 acres, of which area 20,708,000 acres are at the present time (1923) included within national forests. Since Congress authorized the extension of the rectangular system of public-land surveys to the Territory over 1,600,000 acres have been brought under survey. These surveys have been placed under the control of three independent meridians, established as follows: The Seward meridian, initiated just north of Resurrection Bay and extending to the Matanuska coal fields; the Fairbanks meridian, commencing near the town of that name and controlling the surveys in that vicinity, including the Nenana coal fields; and the Copper River meridian, which lies in the valley of the Copper River, and from which surveys have been executed as far north as the Tanana River and south to the Bering River coal fields and the Gulf of Alaska.

All of these surveys have been confined to known agricultural areas, the coal fields, and such adjoining lands as might under normal conditions be attractive to settlers. The acreage above stated does not represent all of the lands in Alaska that have been actually surveyed, as a very substantial area has been covered by special metes and bounds surveys scattered over widely separated regions of Alaska, so as to include town sites, reservations of various types, native allotments, trade and manufacturing sites, and homestead-entry claims. Surveys of the last two types are procurable at the expense of the claimants, but by act of June 28, 1918, Congress has

made provision for homestead surveys without expense to the claimants where the rectangular system of public-land surveys has not been extended over the lands involved.

Not all of the public land laws of the United States have been extended to the Territory, but the principal laws applicable therein are: (1) The mining laws; (2) the coal leasing act of October 20, 1914 (38 Stat. 741), with its amendment of March 4, 1921 (41 Stat. 1363), and the general mineral leasing law of February 25, 1920 (41 Stat. 741); (3) the homestead laws, the entry, however, being restricted to 160 acres; (4) right of way laws; (5) town site laws; (6) entries for the purpose of trade and manufacture; (7) the free use for certain purposes and purchase of timber on the public lands under appropriate regulations.

PRINCIPAL LAWS UNDER WHICH THE AGRICULTURAL LANDS OF THE UNITED STATES HAVE THUS FAR BEEN SOLD AND PATENTED

Exclusive of lands granted to the States by Congress for the support of common schools and for other purposes of internal improvement, and to railroad companies in aid of the construction of railroads, the principal laws under which the agricultural lands of the United States have been subject to disposition are as follows:

Cash and credit sales: Act of May 18, 1796 (1 Stat. 464); May 10, 1800 (2 Stat. 13). Repealed as to credit sales April 24, 1820 (3 Stat. 566).

Military bounty land warrants: United States Revised Statutes, section 2414 and 2446, and special legislation.

Preemption: Act of September 4, 1841 (5 Stat. 453). Repealed March 3, 1891 (26 Stat. 1095).

Donation: Act of September 27, 1850 (9 Stat. 496). Expired by limitation December 1, 1855.

Isolated tracts: United States Revised Statutes, section 2455, and amendatory legislation.

Graduation entries: Act of August 4, 1854 (10 Stat. 575). Repealed June 2, 1862 (12 Stat. 413).

Homestead, 160 acres: Act of May 20, 1862 (12 Stat. 392).

Reclamation homestead: Act of June 17, 1902 (32 Stat. 388).

National forest homestead: Act of June 11, 1906 (34 Stat. 233).

Enlarged homestead: Act of February 19, 1909 (35 Stat. 639).

Grazing homestead: Act of December 29, 1916 (39 Stat. 862).

Desert lands: Act of March 3, 1877 (19 Stat. 377), and March 3, 1891 (26 Stat. 1095).

Timber and stone: Act of June 3, 1878 (20 Stat. 89).

Timber culture: Act of June 14, 1878 (20 Stat. 113). Repealed March 3, 1891 (26 Stat. 1095).

Arid lands: Carey Act, August 18, 1894 (28 Stat. 422).

Kinkaid Act (Nebraska): Act of April 28, 1904.

STATUTES AUTHORIZING EXPLORATION AND SALE OF MINERAL LANDS

The laws authorizing the sale of mineral lands are found in the acts of July 26, 1866 (14 Stat. 252); July 9, 1870 (16 Stat. 217); and May 10, 1872 (17 Stat. 91). Codified in the United States Revised Statutes, sections 2318 to 2344, inclusive.

Sale of coal lands

The location and sale of coal lands is authorized by the act of March 3, 1873 (17 Stat. 607). Codified in United States Revised Statutes, sections 2347 to 2352, inclusive.

Mineral-leasing laws

The act of October 20, 1914 (38 Stat. 741), provides for leases of coal lands in the Territory of Alaska.

The act of October 2, 1917 (40 Stat. 297), authorizes the issuance of leases for lands containing deposits of potash.

The act of February 25, 1920 (41 Stat. 437), provides for leases of lands that contain valuable deposits of coal, phosphate, oil, oil shale, gas, and sodium.

In conclusion

In a paper of this character only an outline of the historical events leading to the acquisition of our public lands, and of the policy of Congress in dealing with them can be given. No mention can be made of laws enacted to meet special conditions, subsequently amended or repealed, or of the many statutes that now enter into and form the body of our public-land laws. As heretofore noted, the administration of these laws is primarily vested in the Commissioner of the General Land Office, under the supervision of the Secretary of the Interior.

Regulations and instructions under the public-land laws are issued by the General Land Office, and copies of these can be had, as well as general advice on the subject of the public lands, on application to the Commissioner of the General Land Office at Washington, D. C.

THE RECTANGULAR SYSTEM OF SURVEYING

(Reprint from the Land Service Bulletin, April, 1918)

The inhabitant of that part of the Nation which once constituted the public domain, whose activities involve or relate to land transactions, little dreams perhaps as he complacently employs in the conduct of his business the simple and comprehensive form of description used by the Government in designating the subdivisions of its western areas, that he is enjoying the uses and benefits of the most thorough and effective system of land identification ever devised by man—the rectangular system of surveying the public lands. Nor is

he perhaps conscious of the beauty and consistency of the scientific aspects of that system, nor fully cognizant of its economic efficiency which has saved untold millions of dollars to landowners in the public-land States by precluding the possibility of such litigation over boundaries as is so common in the original States; nor in all probability has he ever given the history of its origin and development so much as a passing thought.

And it may be that even students of history and other delvers into the dusty records of the past who might attempt to recall without special investigation the circumstances of its origin, would find themselves in doubt as to the facts, or even in error in their conclusions as to its authorship. Unfortunately no work has dealt primarily with the very early history of land surveying in America, and although such official records and papers as are now available and such historical works and writings of the times as touch upon the problems of the western territory make occasional allusions to it, they can not always be reconciled with one another and if considered independently may lead to different conclusions. Among those credited with the authorship of the public-land surveying system are Washington, Jefferson, William Grayson, Thomas Hutchins, Rufus Putnam, Jared Mansfield, and an engineer officer of the Continental Army named DeWitte, while one writer goes so far as to see in it the counterpart in principle of a survey system first used in the Roman Empire. It is only by careful review of the whole record that we are forced to the inevitable conclusion that the perfected system is not the creation of any one man, but of a number of men throughout the course of many years; and, like all great inventions born of necessity, has been like her children reared in the slow but thorough process of evolution to full growth and perfection. We will attempt to briefly review the record.

Shortly after the signing of the Declaration of Independence, Congress adopted resolutions making provision for the giving of bounties in land (although at that time the general Government had not acquired a public domain) to the officers and soldiers of the Continental Army who should serve throughout the war. A few months before the peace of Paris, or in June, 1783, and prior to the disbandment of the Army, 283 officers thereof petitioned Congress to grant them the bounty lands that had been previously voted them and requested permission to make their selections in a contiguous body in the country west of the Allegheny Mountains between the Ohio River and Lake Erie. Claim to this area, which was then known as the northwest territory and which was of very indefinite form and extent, had been relinquished by the several States in favor of the Federal Government, whose permanent title to it with definite limits was finally confirmed by the treaty of 1783, by which Great Britain

abandoned claim to all territory north of 31° of north latitude east of the Mississippi River. The statesmen of that day were keenly alive to the possibilities of this rich region as sources of national revenue and power and they immediately set about formulating plans for its exploration, survey, and settlement. The question was as to policy and methods.

THE ORDINANCE OF 1785

On May 7, 1784, a committee of the Continental Congress composed of Thomas Jefferson of Virginia, chairman, Hugh Williamson of North Carolina, David Howell of Rhode Island, Elbridge Gerry of Massachusetts, and Jacob Read of South Carolina, reported "an ordinance for ascertaining the mode of locating and disposing of lands in the western territory and for other purposes therein mentioned." This ordinance which evidently had been prepared with the greatest care was wholly in Jefferson's handwriting and there is every reason to believe that he was its sole author. That part of the report which related to surveys made provision for the division of the public lands into "hundreds" of 10 geographical miles square and those again into lots of 1 mile square each, to be numbered from 1 to 100 and all lines to be laid out on the ground in the cardinal directions.

It so happened that several weeks after this ordinance was reported Jefferson was commissioned by the Continental Congress minister to France to assist Franklin and Adams in negotiating commercial treaties with European countries, and shortly thereafter left the United States. He, therefore, took no further part in the discussions of this question. The responsibility of guiding the pending legislation to enactment into law, to which there was considerable opposition, appears to have fallen to William Grayson, Delegate to the Continental Congress from Virginia, who, on April 14, 1785, reported out of committee a new ordinance which closely followed in principle the one written by Jefferson, but which modified in some respects a few of the minor provisions thereof. The most important of these amendments, as far as the surveying feature was concerned, was a reduction in the size of the township from 10 to 7 miles square and the appointment of a Geographer of the United States. Also for the first time in the record of this legislation Grayson's report employed the words "township" and "section." Finally, after several weeks of earnest debate and bitter contention between the advocates of survey and location by fixed system and those who adhered to the older principle of indiscriminate location, the bill was amended to provide for a 6-mile square township in lieu of one of 7 miles square, and for "lots" to be protracted on paper instead of "sections" to be established on the ground, and in this form it became a law on May 20, 1785.

This then, the famous ordinance of 1785, with its bare provisions for the survey of 6-mile squares called townships, with its lack of reference to scientific methods of procedure, or thought of comprehensive coordination, crude, immature, and indefinite, but strong and clear-cut in purpose and exhibiting in every line the authentic proofs of the validity and vitality of the new democracy, was the origin *by law* of the rectangular system of surveying the public lands.

EARLY HISTORY

But why the 6-mile square rather than the one of 10 miles proposed by Jefferson, or the one of 7 miles advocated by Grayson, or indeed why a system of squares at all? Why was not the plan adopted that man has so frequently employed in the settlement of new countries ever since the world began—the plan of indiscriminate location and survey? We must go back to Colonial times for the answer.

As the early settlements along the coast of New England increased in population and the westward movement to the fertile valleys of the Merrimac and Connecticut Rivers began, it became apparent to the government of the colonies, at first in the interests of orderly settlement of the choice lands and later in order to encourage settlement on the less desirable areas, that some definite and just policy of land disposal must be formulated. Such a policy finally took shape and was first put into practice by the Colony of Massachusetts, which in 1634 authorized its General Court to make small grants of lands suitable for plantations to individuals and groups of individuals. These grants, known as "towns," were surveyed and recorded and were settled as colonies with definite forms of local government. Where the topography of the country permitted they were of about the same general size but often very irregular in outline, as the purpose was to embrace as much agricultural land in the prescribed area as possible. The plan of town grant, at first experimental in nature, proved to be a wonderful success. In the course of time it became evident that the 6-mile square or its equivalent in area was the most practical size for all purposes and also that uniformity of outline was highly desirable. So the tendency grew towards the granting of areas containing about 36 square miles in as nearly square form as possible. It is probable that the first town of this size, which although rectangular in shape was not square, was Chelmsford, on the Merrimac River, incorporated in 1652; while the records show that the first grant in the form of a square of 6 miles to the side was made by the General Court of Massachusetts in 1656 and was incorporated under the name of Marlborough. The boundaries of this town were not run on the cardinals, nevertheless it may lay substantial claim to the honor of

being at least in shape and area the original township. As settlement continued to advance to the west the 6-mile square township grew in favor until it finally became the recognized unit of land grant in all the New England Colonies. It was not, however, until 1749 that the first standard 6-mile square township, with boundaries bearing by official order north and south and east and west, regardless of the nature of the topography, was surveyed and recorded. The survey of this township which was authorized by Governor Wentworth, of New Hampshire, at Bennington, 36 years before the passage of the Federal land ordinance of 1785, marked the beginning of the plan of survey by mathematical system which had been in process of formation in the New England Colonies for over a hundred years and which later developed into the Federal system. Crude and lacking in scientific precision as it was, it nevertheless had proven its value for the purposes intended, and had attracted the attention of many men of prominence in the other Colonies. Jefferson in particular was impressed with its practicability and urged its adoption in identifying and settling the community lands of Virginia. In this he was supported by many other Virginians, but without success. He nevertheless clung to the idea and clearly foresaw its possibilities as a means of accomplishing a perfect identification and an orderly settlement of the newly acquired public domain; and as has been mentioned before, embodied the principle in his report to Congress, only making provision therein for a 10-mile square township instead of one of 6 miles square. This 10-mile provision was in accordance with Jefferson's well-known ideas regarding the value of the decimal system. He had recently proposed a division of the northwest territory into 10 States in square form of 100 miles to the side, and had but lately devised and secured the adoption of our present decimal system of money values.

But the New England survey plan did not appeal to everybody. Congress was nearly evenly divided between the advocates of survey and location by system on the public domain and those who upheld indiscriminate location. Most of the New England Delegates strongly supported the survey-by-system plan, which had proven to be such a boon to their own commonwealths, and in this they were upheld by some of the strongest of the Members from Virginia and elsewhere, but the majority of the Delegates outside of New England were arrayed in powerful opposition to the proposed measure. The arguments of both sides were forceful and bitter.

During the early consideration of the public-land question Gen. Rufus Putnam, of Massachusetts, chief of engineers of the Continental Army and a practical surveyor, wrote to General Washington strongly recommending the New England township system of survey, with which he had been long familiar, as offering the best means

for disposing of the lands of the northwest territory. Putnam's letter went into the subject at some length, and it is not improbable that Washington, who entertained a very high opinion of Putnam's judgment and ability, may have been converted to the proposed system and had used his influence in securing its passage. It is also of record that Thomas Hutchins, the geographer, a strong advocate of survey by system, favored Putnam's plan of a 6-mile-square township, which was only in fact the New England plan. At any rate, on Grayson's own motion, which was seconded by James Monroe, of Virginia, and strongly supported by Rufus King, of Massachusetts, the 6-mile provision was incorporated in the ordinance and enacted into law.

DEVELOPMENT OF THE SYSTEM

Now to return to those 283 officers of the Continental Army to whom Congress had voted bounty lands and to numerous other petitioners for surveys; a public domain had been acquired and a plan for its survey and disposal had been formulated and enacted into law. It remained only to put the plan into execution. But just a word as to that plan.

The rectangular system of surveying at this time consisted of a 6-mile-square township with boundaries in the cardinal directions, but with no provision for correction for convergency of meridians, or for disposing of excess or definciency of measurements, or for primary control, except that Ellicott's Line, which was the boundary between Pennsylvania and Ohio, should serve as the initial reference line, and that the first east and west line should be run west therefrom. These were not base lines and principal meridians as we understand them to-day. Possibly it was intended that such details were to be left to the geographer's judgment, or perhaps in the heat of debate they were overlooked, or, as seems more probable, their importance in the proposed scheme of survey was not understood at that time.

So the system was launched on the public domain in what is now the State of Ohio; first, on the lands intended for those Revolutionary soldiers—the first petitioners of record for a public-land survey—and the many other legitimate claimants of the time. Large tracts already had been designated, among them the United States military lands, the Connecticut Reserve, the Ohio Co.'s Purchase, the Virginia military lands, etc. The necessity for the early survey of these areas was urgent, and little time was devoted to the working out of a uniform system of detailed procedure. Each surveyor, while observing in general the requirements of the law, seems to have used his own judgment in many matters of lesser importance. Hutchins's scheme of lotting was not universally followed nor was

it finally adopted. The system was new and its field far flung. The surveying organization had not yet gathered its strength or formulated a definite policy of technical practice.

Such was the condition of affairs in 1796. In that year, under authority of an act of Congress, President Washington appointed General Rufus Putnam, who had led one of the first parties of settlers to the northwest territory, to the newly created office of Surveyor General of the United States, which position he held until 1803. Under his direction the public-land surveys which were still confined to Ohio made rapid, and for a while consistent, progress. Some excellent field work was done for those times under Putnam's supervision, especially by Seth Pease on the Western Reserve and by Israel Ludlow on the western Indian boundary, and on the meridian north from the mouth of the Great Miami River, later adopted, as far as it went, as the boundary line between Indiana and Ohio; but the lack of systematic control, which even in better executed surveys than these were would have been dangerous, could not but have led, as the surveys expanded, to gross error and distortion. This was the case. To Putnam, however, probably belongs the credit of having recommended to Congress the modern system of numbering "sections" (which name was first used by him in place of "lots"), of running their boundaries out on the ground, and of throwing the excess and deficiency of measurement on the north and west exterior boundaries; also for having first used bearing trees as corner accessories. These constructive modifications, which were enacted into law in the acts of 1796 and 1800, marked important steps in the development of the system. But Putnam had not found the key to the all-important problem of control. To his successor belongs that honor.

Jared Mansfield was selected by President Jefferson to succeed Putnam in 1803 as Surveyor General of the United States, and to him must always belong the credit of having not only introduced a refinement of scientific method to public land surveying it had never known before, but of placing the system beyond all possibility of failure. He was a man of recognized scientific attainment, of sound judgment, tact, and energy, an excellent administrative officer, forceful and just in dealing with the many sided problems confronting his field parties in the western country, and thoroughly absorbed in his work. He furthermore enjoyed the full confidence of President Jefferson, who took a keen interest in and gave unstinted encouragement to him in his work. Mansfield soon realized the inevitable outcome of a further expansion of surveys without proper coordination, and clearly saw the necessity of fixing on the ground definite lines of control and limits of error. Fortunately he had

in the newly created territory of Indiana a virgin field and a much less difficult country in which to operate than his predecessor had. His first work was the scientific establishment of the Indiana base line near the southern portion, and the second principal meridian a little to the west of the center of the territory. He next named the meridional line previously run by Ludlow the first principal meridian. This line was extended north in 1817 and became the boundary between the States of Ohio and Indiana.

Central and northern Indiana were held by the Indians until 1818 and later, and therefore necessarily Mansfield's surveys were confined to the southern part of the territory and were practically completed in a few years. He next extended the Indiana base line to the Mississippi River and established the third principal meridian near the center of the territory of Illinois and then proceeded with the subdivisional surveys, never getting very far away from the base line. These were the best of the surveys executed up to that time. He resigned his office in 1812.

Mansfield's part in the development of the rectangular system of surveying was the introduction of primary control in the form of base lines and principal meridians, and the establishment of these lines in accordance with scientific principles. They constituted the framework around which the structure—townships—was built. Up to this time what should have been created first had been created last and the fact of its creation at all is Mansfield's achievement. It is true that in the Ohio surveys certain lines were called meridians and base lines but they were merely limiting or boundary lines without coordination, and not principal meridians and base lines in the sense Mansfield used them or as they are used to-day. Thus was accomplished one more great step which permanently assured the future success of the rectangular system of surveying.

But there was still another step to be taken before the system could be called perfect; and to Edward Tiffin, the first Commissioner of the General Land Office under the act of April 25, 1812, which created that office, and afterwards Surveyor General of the northwest territory, belongs the honor of its introduction. As has been said before, no provision had been made in the Federal land ordinance of 1785 for offsetting the effects of convergency although it is known that the matter had been placed before some of the Members of the Continental Congress at the time the ordinance was being considered. Timothy Pickering, in particular, wrote to Rufus King, Delegate from Massachusetts, and called attention to the mathematical inconsistency of the survey requirements of the proposed legislation; but nothing was done about it. Hutchins seems to have ignored it and Putnam does not appear to have given it a thought. Even Mansfield, who must have understood the problem, must have concluded that his

exterior lines had not been projected far enough north and south of the base line to be seriously affected by convergency. At any rate his records show that he paid no attention to it. But it soon became apparent to Edward Tiffin, who extended Mansfield's surveys northerly in Indiana and in Illinois, that additional initial lines and controlling lines must be established at certain intervals as the township surveys grew in distance from the base lines; and to him belongs the credit of devising and of inaugurating just a hundred years ago the scheme of guide meridians and standard parallels which constitute such an important part of public land surveys of to-day.

THE PERFECTED SYSTEM

The system was now perfect in principle. Numerous refinements of practice and improvements of methods of far-reaching importance have been made a part of it since the days of Edward Tiffin; it has been shaped to meet newer aspects of the older problems and developed to take care of the intricate practice of resurveying which time and the elements and the frailty of human nature has rendered necessary; but it is the same in principle and the same in purpose now as it was then, and is after all simply the rectangular system of coordinates applied in a practical way.

So there is no mystery surrounding the origin of the public land survey system, and its authorship can not be credited to any one man. In the Colonial days of our country, amidst the struggles and vicissitudes of pioneering, it had its humble beginnings, and on the skirmish line of advancing civilization it had its growth. The General Court of Massachusetts evolved in the course of a hundred years from the welter and maze of its earliest form a definite size and shape for its primary unit, and Wentworth, of Colonial New Hampshire, reduced its practical application to a semblance of mathematical system. In the struggle for supremacy between systematic and indiscriminate location it found a sturdy champion in Rufus Putnam, and Washington, by force of his influence, helped swing the balance in its favor. Rufus King, Timothy Pickering, Monroe, and many others fought for its adoption by the Continental Congress, and the untiring efforts of Grayson made it a reality. But to Jefferson belongs the credit of having embodied its spirit and principle in the first report to Congress and in later years of contributing to, if not assuring, its success by the weight of his advocacy. And in the field, while undergoing practical tests under none too favorable conditions, there are many whose energy, ability, and patience have guided it past the breakers and lead it on to success. Hutchins, DeWitte, and others of lesser note have played a part in shaping the details of its technical form, and again, Rufus Putnam, whose energies had been so freely lent in securing its adoption, prosecuted it

in the field in the face of such obstacles and opposition as would have discouraged a less courageous spirit; and Mansfield in full understanding of its purpose and intent, crystallized it and prepared it for Tiffin's finishing touch.

The mission of the rectangular system is nearly accomplished in the States. The only virgin field of large extent under the jurisdiction of this country left for its attention is Alaska. Some day perhaps it may be adopted by other nations to help develop the wilder parts of their domains. Perhaps not. But should it ever be employed elsewhere—in another land—it can not but take with it to that land, by reason of its purpose, a breath of the spirit of the great democracy that gave it birth, and help contribute to the everlasting welfare and happiness of the dweller within its bounds.

In the preparation of this article frequent reference has been made to "Historical Collections of Massachusetts," Barber; "Historical Collections of Connecticut," Barber; Biographies of Washington and Jefferson, historical works dealing with the Revolutionary period, Standard Encyclopedias, "The Writings of Thomas Jefferson," records of the General Land Office, and the valuable papers of H. C. Moore and W. A. Truesdale, especially that of the latter, treating of the early history of settlement in the United States.

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